Regular Patent Application of

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For

COLLAPSIBLE BICYCLE CASE

This application is based on U.S. Provisional Patent application number 60/402,343 filed on August 9, 2002.

BACKGROUND—FIELD OF INVENTION

This invention relates to a bicycle transport case, specifically to a lightweight, transport case, which can be disassembled and folded down into a compact position for carrying while riding a bicycle.

BACKGROUND—DESCRIPTION OF PRIOR ART

Travelers, including recreational and professional cyclists, often require or desire the shipment of a bicycle by air or ground to a travel destination for use at that destination. The bicycle is usually shipped in a hard-sided or soft-sided bicycle case. Among shipping cases, there are important differences in the amount of protection for the bicycle. These differences include the ease in which the bicycle is packed into the bicycle case, the ease of manually transporting the loaded bicycle case, the ease of carrying the bicycle case while riding a bicycle, and the storable size of the bicycle case when it is not in use.

Bicycle cases can be divided into the categories of collapsible and non-collapsible. The prior art demonstrates a variety of non-collapsible bicycle cases that adequately protect the bicycle from abuse during shipping. These bicycle cases are heavy and take up large amounts of storage space when not in use. They are not easily transported and often must be left behind at a central storage point to be reclaimed on a return trip. This presents a problem in finding a suitable place to store the container and limits the use of further public transportation at a later time during a bicycling tour.

The attempts at providing an easy way to transport a bicycle case while riding a bicycle are demonstrated in the prior art, by several bicycle cases that convert into accessories for the transportation of travel gear. These bicycle cases can be carried to other locations while riding the bicycle. They also have the benefit of providing a means to transport luggage. These examples are either overly complicated to use or do not work with full-sized bicycles.

Brenner, U.S. Pat. No. 4,390,088, discloses a bicycle case that reconfigures into a saddlebag. A disadvantage of Brenner is that the conversion from the bicycle case configuration to the saddlebag configuration is very complicated because it involves taking apart and reconfiguring multiple panels and straps. Another disadvantage is that luggage items must be unpacked into another bag when the saddlebags are reconfigured into a bicycle case.

The U.S. company, Bicycle Friday, demonstrates the use of a bicycle case for a folding bicycle. This bicycle case easily converts into a trailer. A disadvantage of the Bicycle Friday TavelCase is that it does not work with a regular-sized bicycle. Another disadvantage is that the trailer is a two-wheeled trailer, which unlike a single-wheeled trailer, is too wide to be pulled behind a bicycle on narrow trails.

Moench, German Pat. No. 97-551145/199751, discloses a trailer consisting of components, which can be rebuilt to form a bicycle case. A disadvantage of Moench is that the conversion from trailer to bicycle case is a complicated procedure, involving disassembling and reassembling the disconnecting parts of the frame structure. Another disadvantage is that the two-wheeled trailer does not have the performance benefits of a single-wheeled trailer.

The other collapsible bicycle cases in the prior art have the advantage over the prior art noncollapsible bicycle cases that they use up less storage space when not in use. All of the collapsible bicycle cases have the disadvantage of not providing an easy way to transport them while riding a bicycle. Specifically, Johnson, U.S. Pat. No. 4,756,416, discloses a light-weight flexible housing for removable, rigidifying panels. Another disadvantage of Johnson is that the panels do not have the structural-enhancing benefit of being connected by hinges or cross support

members. Still an additional disadvantage is that it is complicated to use because each rigidifying panel must be inserted into its specific sleeve when setting it up for use.

Thompson, U.S. Pat. No. 3,871,546, discloses the use of hinged support panels that provide rigid protection and collapse with ease. This hinge structure has greater protective abilities than Johnson does, but Thompson still has the disadvantage that there is no rigid protection for the sides of the bicycle.

Lickton, U.S. Pat. No. 6,039,243, addresses the concern of rigid protection for all sides of the bicycle by disclosing the use of hinged support panels that completely enclose the case. Still the disadvantage of not providing a convenient means for transporting these cases while riding a bicycle is not addressed by Lickton.

Within the prior art for non-collapsible cases, there are several examples of useful methods of construction. Let it be noted that these features have not been previously implemented in collapsible cases. Williams, U.S. Pat. No. 4,991,715, and Dayton U.S. Pat. No. 4,792,039, both disclose a rigid, adjustable base for the vertical mounting of a bicycle frame by its front and rear dropouts. Delgado, U.S. Pat. No. 4,892,190, discloses an internal bicycle support system comprised of support bars that hold the bicycle in a centered position between the impact absorbing sides of the case. Profeta, U.S. Pat. No. 4,378,883, discloses a bicycle case that is shaped to closely fit the contour of a disassembled bicycle and uses up less storage and shipping space.

A need, therefore, has arisen for a collapsible bicycle case that is quick and easy to assemble and disassemble, works with full-size bicycles, is easy to transport while riding a bicycle, is easy to transport manually when loaded, takes up little storage space when not in use, and offers complete protection against the abusiveness of cargo handling.

Objects and Advantages

Accordingly, several objects and advantages of the present invention are:

(a) to provide a collapsible bicycle case that is quick and easy to assemble and disassemble.

(b) to provide a collapsible bicycle case that is lightweight and can be easily transported by a cyclist while riding a bicycle. It is difficult to obtain bicycle cases and to conveniently store them when traveling. This bicycle case solves both of these problems by providing a means to transport it while traveling by bicycle.

(c) to provide a collapsible bicycle case that offers complete protection for a bicycle against the abusiveness of cargo handling.

(d) to provide a collapsible bicycle case with devises for holding the bicycle in a centered position between the case's protective panels, so that the bicycle does not come into contact with the panels as they are absorbing the abuses of cargo handling.

(e) to provide a collapsible bicycle case that is easy to transport manually when loaded.

(f) to provide a collapsible bicycle case that takes up a minimal amount of storage space when not in use.

(g) to provide a collapsible bicycle case that has adjustable brackets for mounting a bicycle's front and rear dropouts, accommodating a variety of bicycle sizes.

(h) to provide a collapsible bicycle case that fits a full-sized, disassembled, adult bicycle.

(i) to provide a collapsible bicycle case that is contoured around the shape of a disassembled bicycle in order to save space in shipping and comply with shipping standards.

(j) to provide a collapsible bicycle case that is cost effective to produce.

(k) to provide a collapsible bicycle case with an embodiment that can utilize the frame structure of a bicycle trailer without impairing the normal use of the bicycle trailer. The bicycle trailer can be used for transporting travel gear after it has assisted in transporting the bicycle to the point of departure of a bicycle tour. The particular trailer used in the preferred embodiment has multiple design benefits including its single-wheeled design that allows for the trailer to be pulled behind a bicycle on narrow trails.

(l) to provide a collapsible bicycle case with a preferred embodiment that contains components that can easily assemble and disassemble onto a bicycle trailer, allowing for easy initial setup and for easy removal when it is desired to use the trailer without the added weight of the bicycle case components.

(m) to provide a collapsible bicycle case with a preferred embodiment that enables cost efficiency for the users of a bicycle trailer by allowing them to gain a secondary purpose for their bicycle trailer.

(n) to provide a collapsible bicycle case with an additional embodiment that mounts onto a collapsible bicycle case frame. The components of the bicycle case and the collapsible bicycle frame can be folded up and collapsed into a position that can be mounted to the seat post of a bicycle and easily transported while riding the bicycle.

Further objects and advantages will become apparent from a consideration of the ensuing description and drawings.

SUMMARY

A lightweight bicycle transport case, which is mounted to and utilizes a central frame structure as a base support, and can be disassembled and folded down onto the central frame structure for ease of transport while riding the bicycle. This central frame structure is either a collapsible structure that can be mounted to the bicycle or a bicycle trailer that can be towed behind the bicycle. When the bicycle trailer is used as the central frame structure, it can also be used to transport travel gear during bicycle travel.

DRAWINGS

Drawing Figures

Fig 1A shows a see-through view of the panel assemblies;

Fig 1B shows an external view of the collapsible bicycle case. The crossbars assemblies, which would not normally be visible, are depicted to show their positioning in relation to the panel assemblies;

Fig 1C shows an external view of the rear end of the collapsible bicycle case;

Fig 1D shows an additional external view of the rear end of the collapsible bicycle case;

Fig 2 shows a bicycle trailer with folded-down side panels mounted to it;

Fig 3 shows a bicycle trailer mounted to a bicycle;

Fig 4 shows a panel cinch;

Fig 5 shows an exploded view of a crossbar assembly. A section of a panel assembly and a see through section of the top cover are depicted to show the relative position of the crossbar assembly;

Fig 6 shows the underside of the top cover in an unrolled position;

Fig 7A shows the top cover in a rolled up position. It is shown inside of a see through view of a handlebar bag;

Fig 7B shows the top cover and the panel assemblies inside of a see through view of the shipping/storage bag

Fig 8A shows the front bracket and the trailer fork caps;

Fig 8B shows the trailer fork mounting assemblies;

Fig 9 shows the rear bracket;

Fig 10 shows the derailleur guard;

Fig 11 shows the caster assembly;

Fig 12 shows the front tensioner;

Fig 13 shows the rear tensioner;

Fig 14 shows the rearward-most of the two frame tensioners;

Fig 15 shows the placement of the two bicycle wheels in relation to the bicycle frame when it is mounted in the bicycle case for shipping;

Fig 16 shows the placement of the handlebars against the bicycle frame when it is mounted in the bicycle case for shipping. The handlebars are shown in the see through handlebar bag;

Fig 17 shows the placement of the seat post on the bottom of the trailer for shipping;

Fig 18 shows a see-through view of the panel assemblies mounted to the collapsible frame;

Fig 19 shows the collapsible frame in its open position without the side panels mounted;

Fig 20 shows the collapsible frame in its collapsed position with side panels mounted in their folded position. The bicycle case is shown mounted on the seat post of a bicycle.

Reference Numerals In Drawings

30 trailer	31 trailer wheel
32 trailer fork	33 trailer sides
34 panel assemblies	35 luggage stop
36 crossbar caps	37 trailer bottom tube
38 crossbars	39 crossbar assemblies
40 center handle	41 trailer fork caps
42 front handle	43 trailer bottom mesh
44 frame tensioners	46 front tensioner
48 rear tensioner	49 panel holes
50 lich pins	51 linch pin loops
52 grommets	54 front bracket
56 rear bracket	58 derailleur guard
60 caster assemblies	61 bicycle
62 bicycle frame	64 bicycle wheels
66 handlebar	68 seat post
70 top tube	72 front dropouts
74 rear dropouts	76 top cover
78 bottom front panels	80 top front panels

82 top rear panels
84 bottom rear panels
86 center handle straps
88 front handle strap
90 cover buckles
96 support straps
98 strap slots
100 cover hooks
101 cover loops
102 panel rings
104 cinch hole patterns
106 horizontal hinges
110 bottom spread hinges
112 top spread hinges
114 vertical hinges
115 trailer fork clamps
116 trailer fork screws
117 trailer fork nuts
118 wing nuts
119 trailer fork mounting assemblies
120 front bracket slots
122 axle nuts
124 axle spacers
126 front axle positions
127 front bracket tabs
128 front axle
130 quick releases
132 rear axle
138 rear axle positions
140 quick release nuts
141 rear bracket gap
142 rear clamp screws
143 rear bracket top piece
144 rear bracket clamp
145 rear bracket tabs
146 derailleur
148 guard mount screw
150 guard bracket
152 guard plate
154 guard plate screws
156 casters
158 caster brackets
160 caster bracket hinges
162 sex bolts
164 thumb screws
165 panel cinches
166 elastic cinches
168 cinch hooks
170 cinch cord closures
171 pads
172 cord cinches
174 crossbar sleeves
175 center panel
176 top cover skirts
178 front tensioner cords
179 front tensioner cord stop
180 front tensioner buckle
181 front tensioner cord lock
182 rear tensioner cords
184 rear tensioner ring
186 rear bracket hook
187 frame tensioner loops
188 frame tensioner cords
189 frame tensioner guides
190 frame tensioner cord locks
191 frame tensioner loop locks
192 frame tensioner cord stops
193 frame tensioner loop stops

194 bicycle wheel elastic
196 handlebar bag
198 compression straps
200 seat post elastic
202 collapsible frame
204 collapsible frame front casters
206 collapsible frame rear casters
208 mounting body
210 swivel arm joints
211 panel support joints
212 swivel arms
214 panel supports
216 extendable arm
218 seat post mount
220 collapsible frame panel mounts
222 small wheel
224 shipping/storage bag

DETAILED DESCRIPTION

Description--Figs 1-18—Preferred Embodiment

A preferred embodiment of the bicycle case of the present invention is illustrated with an internal view in Fig 1A. All of the parts of a disassembled bicycle **61** are visible. A trailer **30** and most of the bicycle case components are also visible. Only the major outlines of the panel assemblies **34** are visible to show their position relative to the bicycle and the other collapsible case components. An external view is illustrated in Fig 1B and a rear external view is illustrated in Fig 1C. A second rear external view is illustrated in Fig 1D. The bicycle case is comprised of the following components: panel assemblies **34**, a front bracket **54**, a rear bracket **56**, a derailleur guard **58**, caster assemblies **60**, and a top cover **76**. These bicycle case components are mounted to and utilize the structure of a bicycle trailer **30**. A disassembled bicycle **61** is mounted to the front bracket **54** and the rear bracket **56** inside of the bicycle case.

Fig 2 depicts the panel assemblies **34** in their folded positions, mounted to the trailer **30**. Fig 3 is a view of the trailer **30** mounted behind a bicycle **61** to illustrate the appearance of the trailer **30** before the bicycle case parts are mounted to it. The bicycle trailer **30** makes up the central frame structure for the assembly of the component parts of the bicycle case. The front bracket **54** and the trailer fork caps **41** mount to the trailer fork **32**. The rear bracket **56** mounts to the luggage stop **35**. The caster assemblies **60** mount to the trailer bottom tube **37** and the trailer bottom mesh **43**. Panel assemblies **34** mount to the trailer sides **33**.

Fig 4 depicts one of the four panel cinches **165** on the inside facing surface of one of the bottom rear panels **84**. The panel cinches **165** are used to mount the panel assemblies **34** to the

trailer sides **33**. The elastic cinches **166** and the cord cinches **172** are laced through the cinch holes patterns **104** and around the trailer sides **33**. The cord cinches **172** are attached to the cinch cord closures **170**. The elastic cinches **166** are attached to the cinch hooks **168**. The cinch hooks **168** are hooked around the cinch cord closures **170**, fixing the panel cinches **165** in position.

Fig 1B depicts an external view of the collapsible bicycle case with the panel assemblies **34** in their open position. The panel assemblies **34** are comprised of rigid panels preferably made from an impact resistant plastic such as ABS. The panel assemblies **34** can be made lighter without a significant reduction of strength and rigidity by removing circular cutouts in a patterned removal throughout the surface of the panel assemblies **34.** The panel assemblies **34** are connected with hinges preferably made from a flexible plastic. The bottom rear panels **84** are mounted to the trailer sides **33.** The top rear panels **82** are located above the bottom rear panels **84** with horizontal hinges **106** fixed between them. The bottom front panels **78** are located in front of the bottom rear panels **84** with bottom spread hinges **110** and top spread hinges **112** fixed between them. The top front panels **80** are located above the bottom front panels **78** with the horizontal hinges **106** fixed between them. Fixed between the top front panels **80** and the top rear panels **82** are the vertical hinges **114**.

Fig 6 depicts the underside of the top cover **76**. The top cover **76** is constructed from a flexible, pliable material, preferably pack cloth. The top cover **76** is comprised of a center panel **175**, top cover skirts **176**, crossbar assemblies **39**, crossbar sleeves **174**, grommets **52**, linch pins **50**, linch pin loops **51**, a front tensioner **46**, a rear tensioner **48**, frame tensioners **44**, pads **171**, center handle straps **86**, a center handle **40**, a front handle strap **88**, and a front handle **42**. The crossbar assemblies **39** are fixed to the center panel **175** by the crossbar sleeves **174**. The cords of the front tensioner **46**, the rear tensioner **48**, and the frame tensioner **44** are laced through each of their adjacent crossbar caps **36**, further fixing the crossbar assemblies **39** to the top cover **76**. The pads **171** are sewn into the center panel **175**. Grommets **52** are located on the top cover skirts **176** positioned on both sides of every crossbar assembly **39** and also on both sides of the front edge of the top cover skirt **176**.

Fig 5 depicts an exploded view of one of the six crossbar assemblies **39** comprised of a crossbar **38** and two crossbar caps **36**. The crossbar cap **36** is inserted through the panel hole **49** and the grommet **52**. The linch pin **50** is inserted through the end of the crossbar cap **36**, fixing it in position. Linch pin loops **51** are sewn into the top cover **76** close to the location of each grommet **52**. The linch pin loops **51** are attached to the linch pins **50.**

Fig 1B depicts the external details of the top cover **76**. The top cover **76** is secured along the perimeter of the panel assemblies **34** by mounting the crossbar assemblies **39** in their relative

positions to the adjacent grommet **52** and panel hole **49** as described above. The front end of the top cover **76** is secured in place with the grommets **52** that fit over the trailer fork caps **41** and are secured in place with linch pins **50**. The trailer fork caps **41** are explained in detail, further on in these specifications. The support straps **96** lace through the support strap slots **98** and through the bottom slots of the cover buckles **90**. The two center handle straps **86** are sewn into the top cover skirt **176** and lace through the top slots of the cover buckles **90**. Both center handle straps **86** meet at the center handle **40,** lacing though its openings. The front handle strap **88** laces through the openings in the front handle **42** and is sewn into the top cover **76**.

Fig 1C shows an external view of the rear end of the top cover **76**. The outside corners of the rear end of the top cover **76** are secured in place with cover hooks **100** that hook to the panel rings **102.** The center section of the rear end of the top cover **76** is secured with cover loops **101** that fit over the trailer **30**. The trailer wheel **31** remains installed to the trailer **30**.

Fig 1D shows a second view of the rear end of the top cover **76.** Additional crossbar assemblies **39** have been added to this area of the top cover **76** to protect the derailleur **146**. The derailleur guard **58** is not used. A small wheel **222** replaces the trailer wheel **31.**

Fig 7A shows the top cover **76** rolled up and stored inside a handlebar bag **196** for easy transport when not in use. Fig 7B shows the top cover **76** and the panel assemblies **34** stored inside of the storage/shipping bag **224.**

Fig 8B depicts one of the four trailer fork mounting assemblies **119**. The trailer fork clamp **115** fits around the trailer fork **32**. The trailer fork screw **116** inserts through the trailer fork clamp **115** and threads into the trailer fork nut **117,** securing it in position on the trailer fork **32**.

Fig 8A depicts the front bracket **54.** Two of the trailer fork mounting assemblies **119** are positioned for mounting to the front bracket **54.** The positioning slots **120** of the front bracket **54** fit over the trailer fork screws **116** of the trailer fork mounting assemblies **119**. The wing nuts **118** thread onto the trailer fork screws **116,** securing the front bracket **54** in place. The front bracket **54** is preferably a profile cut from aluminum and formed with two front bracket tabs **127** bent at right angles. The front bracket tabs **127** have two axle positions **126** for a front axle **128** to be inserted through. Axle spacers **124** fit over the front axle **128**. Two axle nuts **122** thread onto the front axle **128,** fixing the axle spacers **124** in position on the front bracket **54**. The front dropouts **72** of the bicycle **61** fit over the front axle **128**. A quick release **130** inserts through the front axle **128** and threads into a quick release nut **140**, securing the front dropouts **72** to the front axle **128**.

Fig 8A also depicts the trailer fork caps **41**. Two trailer fork mounting assemblies **119** are positioned on the trailer fork **32** for attaching to the trailer fork caps **41**. The trailer fork caps **41** thread onto the trailer fork screws **116**.

Fig 9 depicts the rear bracket **56**. Rear clamp screws **142** insert through a rear bracket top piece **143** and thread into a rear bracket clamp **144**, mounting the rear bracket **56** to the luggage stop **35**. The rear bracket top piece **143** is preferably a profile cut from aluminum with two rear bracket tabs **145** bent at right angles. The rear bracket tabs have five rear axle positions **138** for a rear axle **132** to be inserted through. Axle spacers **124** fit over the rear axle **132**. Two axle nuts **122** thread on the rear axle **132** fixing the axle spacers **124** into position on the rear bracket **56**. The rear dropouts **74** of the bicycle **61** fit over the rear axle **132**. A quick release **130** inserts through the rear axle **132** and threads into a quick release nut **140**, securing the rear dropouts **74** to the rear axle **132**.

Fig 10 depicts the derailleur guard **58**. When the disassembled bicycle **61** is mounted in the bicycle case, the derailleur **146** is located in close proximity to the derailleur guard **58**. A guard mount screw **148** inserts through a guard bracket **150** and threads into the rear bracket **56**. Guard plate screws **154** insert through a guard plate **152** and thread into the guard bracket **150**.

Fig 11 depicts one of two caster assemblies **60**. The caster brackets **158** and the caster bracket hinges **160** are preferably cut or cast out of aluminum. The caster brackets **158** fit over the trailer bottom tube **37**. The sex bolts **162** are inserted through the caster brackets **158** and the caster bracket hinges **160**, joining them together. The thumb screws **164** insert through the caster bracket hinges **160** and the trailer bottom mesh **43** and then thread into the caster brackets **158**, securing them in place. The casters **156** thread into the caster brackets **158**.

Fig 12 depicts the front tensioner **46**. Front tensioner cords **178A** and **178B** are laced through crossbar caps **36A** and **36B** and through the slots of the front tensioner buckle **180.** The front tensioner cords **178A** and **178B** are then laced through the front tensioner cord lock **181** and into the front tensioner cord stop **179**. Front tensioner cord **178C** is laced through front bracket **54** and tied into slots on the front tensioner buckle **180**.

Fig 13 depicts the rear tensioner **48**. Rear tensioner cords **182A**, **182B**, **182C**, and **182D** are laced through crossbar caps **36K**, **36I**, **36J**, and **36L**, and converge at a rear tensioner ring **184**, which they are tied to. The rear bracket hook **186** hooks to the rear tensioner ring **184**, fixing it in place.

Fig 14 depicts the rearward of the two frame tensioners **44**. Frame tensioner cords **188A**, **188B**, **188C**, and **188D** are laced through the crossbar caps **36E**, **36F**, **36G**, and **36H** and then laced through the frame tensioner guide **189**. The frame tensioner cords **188A** and **188B** are laced through the frame tensioner cord lock **190A** and into the frame tensioner cord stop **192A**. The frame tensioner cords **188C** and **188D** are laced through the frame tensioner cord lock **190B** and into the frame tensioner cord stop **192B**. The frame tensioner loop **187** laces around the top tube

70, through the frame tensioner guide **189**, through the frame tensioner loop lock **191**, and into the frame tensioner loop stop **193**. The frame tensioner loop **187** fits over the end of the fame tensioner guide **189,** fixing it against the top tube **70**. The forward most frame tensioner **44** is constructed in the same way as the forward most frame tensioner **44** and utilizes the crossbar caps **36C**, **36D**, **36E**, and **36F**. It mounts to the front section of the top tube **70**.

Fig 15 depicts the placement of the bicycle wheels **64** in relation to the bicycle frame **62**. The bicycle wheel elastic **194** wraps around the bicycle wheels **64** and through the bicycle frame **62**. Fig 16 shows a see-through view of the placement of the handlebars **66** in the handlebar bag **196** in relation to the bicycle frame **62**. The shipping/storage bag **224** shown in Fig 7A can also be used for this same purpose. Compression straps **198** are sewn to the handlebar bag **196**. The compression straps **198** wrap around the bicycle frame **62,** mounting the handlebar bag **196** in position. Fig 17 shows the placement of the seat post **68** on the trailer bottom mesh **43**. The seat post elastic **200** inserts through the bicycle seat **68** and hooks to the trailer bottom tube **37** in two sections, securing it in place.

Operation—Figs. 1-17—Preferred Embodiment

The description of the operation of the bicycle case can be divided into the following four parts: a description of how the components are mounted to the trailer **30**, a description of how the disassembled bicycle **61** is mounted inside of the bicycle case, a description of how the components protect the disassembled bicycle **61**, and a description of how the bicycle case is handled manually with the disassembled bicycle **61** mounted inside of it.

Fig 3 shows the trailer **30** before the bicycle case components are mounted onto it. Fig 2 shows the trailer **30** after the bicycle case components have been mounted onto it. The panel assemblies **34** are mounted to the trailer **30** with the panel cinches **165**. Fig 4 shows a close-up of one of the four panel cinches **165**. The elastic cinches **166** are laced through their own looped section and cinched around the trailer sides **33**. The cord cinches **172** are also laced through their own looped section and cinched around the trailer sides **33**. The cinch hooks **168** on the end of the elastic cinches **166** are stretched towards and hooked onto the cinch cord closures **170** on the end of the cord cinches **172.** The four panel cinches **165,** on the inside facing surfaces of the two bottom rear panels **84,** are hooked around the trailer sides **33** to mount the panel assemblies **34** in position.

Fig 8A and 8B depict the trailer fork mounting assemblies **119**. To install the trailer fork mounting assembly **119**, the trailer fork clamps **115** are bent open and then closed around the tubing of the trailer fork **32**. The trailer fork screws **116** are inserted through the trailer fork clamps

115, threaded into the trailer fork nuts **117,** and tightened in the correct position. The positions of the trailer fork mounting assemblies **119** that are used for the trailer fork caps **41** are towards the front end of the trailer fork **32**. These relative positions are shown in Fig 8A. The trailer fork caps **41** are threaded onto the trailer fork screws **116**.

The position of the trailer fork mounting assemblies **119** for the front bracket **54** is dependent upon where the front bracket **54** needs to be placed along the trailer fork **32** for interfacing with the front dropouts **72** of the bicycle **61**. The distance that the front dropouts **72** extend over the trailer fork **32** is based upon the variable distance between the front dropouts **72** and the rear dropouts **74**. Once the necessary position is determined, the trailer fork mounting assemblies **119** are installed. The front bracket **54** is mounted to the trailer fork mounting assemblies **119**, by inserting the trailer fork screws **116** through the front bracket slots **120**. The thumb screws **118** thread onto the trailer fork screws **116**, fixing the front bracket **54** in position. The front bracket **54** can be further adjusted by removing the axle nuts **122** and the axle spacers **124** and reinstalling the front axle **128** in the other front axle position **126**. The front bracket **54** must be removed from the trailer fork **32** when the trailer **30** is attached behind the bicycle **61** as depicted in Fig 3.

Fig 9 depicts the rear bracket **56** mounted to the luggage stop **35**. The luggage stop **35** fits into the rear bracket gap **141**. Three rear clamp screws **142** insert through the rear bracket top piece **143** and thread into the rear bracket clamp **144**. The rear clamps screws **142** are tightened to clamp the rear bracket **56** onto the luggage stop **35**. The rear axle **132** can be positioned on any of the five rear axle positions **138** by removing the axle nuts **122** and the axle spacers **124** and reinstalling them on the rear axle **132** in the chosen position. The positioning of the rear axle **132** is determined by the relative positioning of the front bracket **54** and the overall fit of the bicycle frame **62** within the bicycle case.

Fig 10 depicts the derailleur guard **58** mounted to the rear bracket **56**. Installation of the derailleur guard **58** involves inserting a guard mount screw **148** through the guard bracket **150** and threading it into the rear bracket **56**. When the disassembled bicycle **61** is loaded into the bicycle case, the derailleur **146** is positioned so that it is protected by the structure of the derailleur guard **58**.

Fig 11 depicts one of the two caster assemblies **60** mounted to the trailer bottom tube **37**. When the caster assemblies **60** are installed, the caster brackets **158** rest on the underside of the trailer bottom tube **37** and the underside of the trailer bottom mesh **43**. The sex bolts **162** function as hinge pins between the caster brackets **158** and the caster bracket hinges **160**. The caster bracket hinges **160** swing up to allow the caster assemblies **60** to fit over the trailer bottom tube **37**. The

caster bracket hinges **160** then swing down over the trailer bottom tube **37** for mounting. The caster bracket hinges **160** rest against the top side of the trailer bottom mesh **43**. The thumb screws **164** insert through the caster bracket hinges **160**, through the trailer bottom mesh **43**, and thread into the caster brackets **158,** fixing the caster assemblies **60** in position. The relative position of the caster assemblies **60** along the trailer bottom tube **37** is shown in Fig 2.

Fig 1C depicts the trailer wheel **31**left installed for use with the collapsible bicycle case. The small wheel **222** depicted in Fig 1D can be used to replace the trailer wheel **31.** The trailer wheel **31** is removed from the trailer **30** and stored inside of the collapsible bicycle case. The small wheel **222** is then installed onto the trailer **30**.

Once the bicycle case components have been installed onto the trailer **30**, it is ready to use as a bicycle case. The bicycle wheels **64** are first removed from the bicycle **61**. The bicycle frame **62** is then mounted to the front bracket **54** and the rear bracket **56** as shown in Fig 1A. Fig 8A depicts the position of the front dropouts **72** in relation to the front bracket **54**. The quick release **130** is tightened to fix the front dropouts **72** into position. Fig 9 depicts the position of the rear dropouts **74** in relation to the rear bracket **56**. The quick release **130** is tightened to fix the rear dropouts **74** in position.

Fig 15 shows how the bicycle wheels **64** are positioned in relation to the bicycle frame **62**. The bicycle wheel elastic **194** laces through the bicycle wheel **64A**, beneath the top tube **70**, and through the other bicycle wheel **64B**. The bicycle wheel elastic **194** is stretched over the top of the bicycle wheels **64** and is fixed to itself, holding them in position.

Fig 16 shows the position of the handlebar **66** in relation to the bicycle frame **62**. The handlebar **66** is removed from the bicycle frame **62**, placed inside the handlebar bag **196** or the shipping storage bag **224,** and positioned on the side of the bicycle frame **62**. The compression straps **198** are wrapped around the bicycle frame **62** and buckled, fixing the handlebar bag **196** in position.

Fig 17 shows one of the possible positions for storing the seat post **68**. The seat post **68** can be transported in a variety of positions depending upon the situation. The seat post **68** is removed from the bicycle frame **62** and placed on the trailer bottom mesh **43**. A seat post elastic **200** is fixed to the trailer bottom tube **37**, laced around the seat post **68**, and fixed to the opposite side of the trailer bottom tube **37**, holding the seat in position.

Fig 2 depicts the panel assemblies **34** in their folded down position. The seat post elastic **200** and the bicycle wheel elastic **194** are stretched around the panel assemblies **34** to fix them in their folded position when they are not functioning as a bicycle case. During the loading of the bicycle **61** into the bicycle case, the seat post elastic **200** and the bicycle wheel elastic **194** are

removed from the panel assemblies **34** and used to secure the seat post **68** and the bicycle wheels **64**.

The following is a description of how the panel assemblies are reconfigured from their folded down position as shown in Fig 2 to their unfolded position as shown in Fig 1B. The top front panels **80** and the bottom front panels **78** are swung forward simultaneously on the bottom spread hinges **110**, the top spread hinges **112**, and the vertical hinges **114**. The top front panels **80** and the top rear panels **82** are then swung up on the horizontal hinges **106**. When both panel assemblies **34** are in their open position, the top cover **76** is ready to be installed.

Fig 1A shows the positions of all of the panel holes **49** for mounting the crossbar assemblies **39**. The position of each of the crossbar assemblies **39** after the top cover **34** has been mounted is shown in Fig 1B. The top cover **76** is mounted to the bicycle case by mounting the fixtures of the crossbar assemblies **39** and the other parts of the top cover **76** to the panel assemblies **34** and by mounting the tensioners to the front bracket **54**, the rear bracket **56**, and the bicycle frame **62**. This can be done in a variety of orders. Following is a description of the preferred order of installation.

First, Fig 5 shows a close-up view of the mounting operation of a crossbar assembly **39**, which is the same for the installation of all of the crossbar assemblies **39**. The crossbar assemblies **39** are mounted to the panel assemblies **34** by inserting the crossbar caps **36** through the panel holes **49** and through the adjacent grommets **52** on the top cover skirts **176**. The linch pins **50** are then inserted through the ends of the crossbar caps **36**, fixing them in position.

The crossbar assembly **39B** is first mounted to the panel holes **49C** and **49D**. The crossbar assembly **39A** is then mounted to the panel holes **49A** and **49B**. At this point, before the trailer fork caps **41** are mounted to the top cover **76**, the front tensioner **46** (Fig 12) is ready for installation. The male and female ends of the front tensioner buckle **180** are clipped together to install the front tensioner **46**. The length of the front tensioner cords **178A** and **178B** are adjusted in relation to the positioning of the front bracket **54**. This is accomplished by releasing the front tensioner cord lock **181** and adjusting the front tensioner cords **178A** and **178B** to the correct length. The trailer fork caps **41** are then mounted to the panel holes **49M** and **49N**. Mounting trailer fork caps **41** is nearly identical to mounting the crossbar caps **36** of the crossbar assemblies **39** as described above. The grommets **52** on the very front edge of the top cover skirt **176** are used for mounting to the trailer fork caps **41**.

The forward most frame tensioner **44** (Fig 14) is then mounted to the top tube **70** of the bicycle frame **62**. The frame tensioner guide **189** is placed on the top tube **70**. The frame tensioner loop **187** extends out of one side of the frame tensioner guide **189**, wraps around the top tube **70**, and then hooks to the other side of the frame tensioner guide **189**. The frame tensioner loop **187** is

tightened by pulling it though the frame tensioner loop lock **191**. The length of the frame tensioner cords **188** are adjusted in relation to the positioning of the bicycle frame **62** within the bicycle case. This is accomplished by releasing the frame tensioner cord locks **190** and adjusting the frame tensioner cords **188** to the correct length.

The crossbar assembly **39C** is then mounted to the panel holes **49E** and **49F**. The rearward frame tensioner **44** (Fig 14) is then mounted to the top tube **70** in the same manner as the forward most frame tensioner **44**. The crossbar assembly **39D** is then mounted to the panel holes **49G** and **49H**. The crossbar assembly **39E** is then mounted to the panel holes **49I** and **49J**. The crossbar assembly **39F** is then mounted to the panel holes **49K** and **49L**. The rear tensioner **48** (Fig 13) is then mounted to the rear bracket **56**. This is accomplished by fitting the rear tensioner ring **184** over the rear bracket hook **186**. The lengths of the rear tensioner cords **182** do not require adjustment.

The rear end of the top cover **76** (Fig 1C) fits over the derailleur guard **58**. To secure the rear end of the top cover **76,** the cover hooks **100** are hooked to the panel rings **102** and the cover loops **101** are wrapped around the trailer **30**. Finally, the male and female ends of the cover buckles **90** (Fig 1B) are attached to join the support straps **96** to the center handle straps **86**.

In the second view of the rear end of the top cover **76** (Fig 1D), the trailer wheel **31** is removed and stored inside of the bicycle case and replace with the small wheel **222.** The rear end of the top cover **76** is secured by installing the bottom most crossbar assemblies **39** into the panel holes **49**.

The bicycle case is ready to transport the disassembled bicycle **61**. The panel assemblies **34** provide protection from impacts to the right and left sides of the disassembled bicycle **61**. The trailer **30** provides protection along the bottom of the disassembled bicycle **61**. The top cover **76** brings the panel assemblies **34** together into a unified assembly and provides protection from impacts to the front, top and rear sides of the disassembled bicycle **61**. The pads **171** are located in the top cover **76** to provide extra protection for the sections of the bicycle frame **62** that are located closest to the top cover **76**. The derailleur guard **58** provides isolated, efficient protection for the asymmetrical position of the derailleur **146**.

The top cover **76** fits snugly over the panel assemblies **34,** creating a rigid, box-like structure. The front tensioner **46**, the rear tensioner **48**, and the frame tensioner **44** hold the top cover **76** and the panel assemblies **34** at a fixed distance from the front bracket **54**, the rear bracket **56**, and the bicycle frame **62**. The panel assemblies **34** and the top cover **34** are thus prevented from coming into contact with the disassembled bicycle **61**. The majority of the force of an impact to the bicycle case is absorbed by the top cover **76** and the panel assemblies **34**. The disassembled

bicycle **61** absorbs only the vibrations of the impact that are transferred through the trailer **30**, the front bracket **54**, the rear bracket **56**, and the frame tensioners **44**.

The bicycle case is easily maneuvered by holding the front handle **42** and pulling while walking forward. The bicycle case rolls on the caster assemblies **60** and the trailer wheel **31** or the small wheel **222**. The casters **156** swivel 360 degrees, allowing the bicycle case to turn as it is pulled along. The bicycle case can be lifted up by grabbing the front handle **42** and the center handle **40**. When lifting the bicycle case in this manner, the majority of its weight is centered on the center handle **40** through the center handle straps **86** and the support straps **96**. When the bicycle case is placed into a luggage compartment, it can be set upright on the caster assemblies **60** and the trailer wheel **31**. It can also be placed on its side, resting on one of the panel assemblies **34**. It is sturdy enough that in either position, other packages can be stacked on top of it. When the bicycle case is placed in a luggage compartment, the trailer wheel **31** can be removed to shorten the overall length of the bicycle case.

When traveling with a disassembled bicycle **61** inside of the bicycle case, it is convenient to carry travel gear in a large backpack, leaving both hands free to deal with the bicycle case. When the bicycle **61** is reassembled for a bicycle tour and the trailer **30** is mounted to the bicycle **61** and reconfigured for transporting travel gear, the large backpack can be placed inside of the trailer **30**. The rolled up top cover **34** in the handlebar bag **196** or the shipping/storage bag **224** and the removed front bracket **54** can be stored inside of the large backpack along with the travel gear.

During some bicycle tours it will be desired to remove the additional weight of the collapsible bicycle case from the trailer **30**. In these instances the panel assemblies **34,** the top cover **76**, the rear bracket **56**, the front bracket **54,** and the caster assemblies **60** can all be removed from the trailer **30** and stored inside of the shipping storage bag **224**. With the entire collapsible bicycle case arranged in this manner, the collapsible bicycle case can be easily stored or shipped ahead for use later in the bicycle tour.

Description—Figs 18-20—Additional Embodiment

An additional embodiment of the bicycle case of the present invention is shown in Figs 18, 19, and 20. Fig 18 shows the bicycle case with an internal view of the disassembled bicycle **61** mounted to the collapsible frame **202**. All of the parts of the disassembled bicycle **61** are visible. Only the major outlines of the panel assemblies **34** are visible, allowing for a less cluttered, internal

view. The external view of the additional embodiment is nearly identical to that of the preferred embodiment pictured in Fig 1B and should be considered as an equivalent depiction.

The additional embodiment utilizes the collapsible frame **202** rather than the trailer **30** as the central frame structure for mounting the components of the bicycle case. The collapsible frame **202** is proportioned so that the bicycle case can fit over it and mount to it in the same way that the bicycle case of the preferred embodiment fits over and mounts to the trailer **30**.

Fig 19 depicts the collapsible frame **202** in its open position without the panel assemblies **34** mounted to it. The collapsible frame **202** is comprised of a mounting body **208**, swivel arms **212**, panel supports **214**, an extendable arm **216**, and a seat post mount **218**. The inside facing ends of the swivel arms **212** are attached through the swivel arm joints **210** to the mounting body **208**. The outside facing ends of the swivel arms **212** are attached to the panel supports **214** through the panel support joints **211**. The extendable arm **216** inserts and attaches to the mounting body **208**.

The front bracket **54** is attached to the extendable arm **216**. The rear bracket **56** is attached to the mounting body **208**. The derailleur guard **58** is mounted to the rear bracket **56**. The collapsible frame front casters **204** are attached to the front bracket **54**. The collapsible frame panel mounts **220** are attached to the front bracket **54** and serve the same purpose as the trailer fork caps **41** of the preferred embodiment by mounting to the opened panel assemblies 34. The collapsible frame rear casters **206** are attached to the rearward panel support joints **211**. The seat post mount **218** is attached to one of the two panel supports **214**. The panel assemblies **34** can be attached to the panel supports **214**.

Refer to the preferred embodiment description and operation sections for details on the front bracket **54**, the rear bracket **56**, the derailleur guard **58**, the panel assemblies **34**, and the top cover **76**.

Fig 20 depicts the additional embodiment with panel assemblies **34** in their folded position and the collapsible frame **202** in its collapsed position. The additional embodiment is shown mounted to the seat post **68** of the bicycle **61** by the seat post mount **218**.

Operation—Additional Embodiment—Figs 18-20

The additional embodiment does not require assembly as does the preferred embodiment. The additional embodiment protects the disassembled bicycle **61** in the same way that the preferred embodiment does. The additional embodiment is also handled manually in the same way that the preferred embodiment is handled. The main difference that will be explained here is the way in which the disassembled bicycle **61** is loaded into the additional embodiment.

Opening the collapsible frame **202** from its closed position as depicted in Fig 20 to its open position as depicted in Fig 19 is the first step in loading the bicycle **61**. This is accomplished by swinging the swivel arms **212** from a position that is parallel to the mounting body **208** to a position that is perpendicular to the mounting body **208**. When the swivel arms **212** are swung open, the attached panel supports **214** are moved to a greater distance from the mounting body **208** while remaining parallel to it. The extendable arm **216** is extended out of the mounting body **208** to its full length.

Fig 18 depicts the disassembled bicycle **61** loaded into the additional embodiment. The disassembled bicycle **61** is mounted onto the front bracket **54** and the rear bracket **56** in the same manner as is done in the preferred embodiment. The panel assemblies **34** and the top cover **76** are opened and assembled in the same manner as is done in the preferred embodiment.

Fig 20 depicts the additional embodiment with the panel assemblies **34** folded up and the collapsible frame **202** in its collapsed position. The additional embodiment is shown mounted to the seat post **68** with the seat post mount **218**. In this position, the bicycle **61** can be ridden while transporting the additional embodiment. The top cover **76** can be tied to the additional embodiment or easily carried in a backpack.

Conclusion, Ramifications, and Scope

Thus, the reader will see that the bicycle case of this invention is easy to assemble and disassemble, is lightweight and easily transported by a cyclist while riding a bicycle, and fully protects a bicycle from abusive cargo handling through the structure itself and with its mechanisms that suspend the bicycle in a centered position apart from its shock absorbing structure. In addition, the bicycle case is easy to manually transport by pulling it on its casters and lifting it by its handles, collapses to a small size to take up minimal storage space when not in use, and is adjustable for a full range of adult-sized bicycles. Furthermore, the preferred embodiment of the bicycle case utilizes a bicycle trailer in a way that allows for the cyclist to also enjoy the benefit of using the bicycle trailer when traveling. The components of the preferred embodiment of the bicycle case can be easily disassembled from the bicycle trailer when the benefit of their use is not desired. A further, additional embodiment of the bicycle case uses a collapsible bicycle case frame as its central frame structure. Once the additional embodiment has been folded up and collapsed, it can be mounted to the seat post of a bicycle and easily transported while riding the bicycle.

While my above description contains many specificities, these should not be construed as limitations on the scope of the invention but rather as an exemplification of one preferred

embodiment thereof. Many other embodiments are possible. For example, the bicycle trailer can be built with the components of the bicycle case integrated into it. The bicycle case can be adapted to function on a variety of bicycle trailers. This includes, but is not limited to, a variety of single-wheeled trailers, a variety of two-wheeled trailers, a variety of trailers utilizing a bicycle-to-trailer mount on the bicycle axle, a variety of trailers utilizing a trailer-to-bicycle mount on the seat post, a variety of trailers utilizing a trailer-to-bicycle mount on a bicycle luggage rack, and a variety of collapsible trailers.

The additional embodiment of the bicycle case of this invention is a collapsible bicycle case frame that provides the central frame structure and the mounting points for the components of the bicycle case. Many of the important elements of this bicycle case can be used in other embodiments of shipping cases. These shipping cases will also involve a central frame structure for mounting the panel assemblies. This central frame structure can either collapse in a manner similar to that of the collapsible bicycle case frame or it can be noncollapsible. These shipping cases will implement panel assemblies, casters, and a top cover similar to that of the preferred and additional embodiments, but it will not implement the bicycle mounting brackets which are specific to shipping a bicycle. Shipping cases that utilize the benefits of the bicycle case will themselves have the benefits of being easy to set up and collapse, of using up less storage space when not in use, of being easier to transport when not in use, and possibly of reconfiguring into a different useful item when not in use

Additional components can be integrated or included with the bicycle case to enhance its performance. For example a variety of pads can be inserted or integrated onto the insides of the panel assemblies and between or around the bicycle wheels and bicycle frame for added protection. Components for fixing the bicycle wheel, the seat post, and the handlebars can be included. Guards to protect the drive train assembly and the brakes can also be included. Fixtures such as pads and straps with hooks can be mounted to the bottom or the side of the bicycle case, allowing for it to mount onto the back or the top of a passenger vehicle.

Each of the components of the bicycle case of this invention can take on a variety of embodiments. This includes, but is not limited to, the components being eliminated or duplicated, the components being changed in size, the components being made of a different material, the components being made in a different shape, the components being connected or associated with its adjacent components in a different manner, the components being given a different mode of operation, and the components being made integrally or separately.

Listed below are all of the major components of the bicycle case of this invention. Each component is followed by a listing of some of its possible embodiments. This list is thorough to

show the range of possible embodiments, but it does not include every possible embodiment. The possible embodiments shall not be limited to what is listed below but shall be determined by the appended claims and their legal equivalents.

It is intended that the embodiments of the component parts of the bicycle case listed below, are considered with reference to all of the possible embodiments of the bicycle cases listed above. The embodiments of these bicycle cases will be more simply referred to as the central frame structures in the following ramifications. In most of the embodiments of the bicycle case, the component parts are mounted to the central frame structure. In the other embodiments, the central frame structure is integrated into and part of the bicycle case components. The term central frame structure refers to all of the possible embodiments of the bicycle case including both the central frame structures integrated into the bicycle case components and the central frame structures not integrated into the bicycle case components.

The function of the panel assemblies is to protect the sides of the disassembled bicycle. A variety of flat, structural materials can be used to accomplish this purpose. These materials include, but are not limited to, a variety of each of the following: plastics, sheet metal, wood paneling, composites, and assemblies of wire forming the shape of a panel. The overall shape of the panels can take on a larger or smaller size. The shape of the panel assemblies can use different shapes to provide more room for configuring the disassembled bicycle in a different manner. The panel assemblies can be integrated into the sides of the central frame structures by permanent attachment or by using the panel assemblies as the sides themselves.

The function of the hinges on the panel assemblies is to allow the panels to fold up against each other. Because of these hinges, the panel assemblies can be folded and unfolded between the small compact position that is easy to transport while riding the bicycle and the large surfaces that protects the sides of the bicycle. A variety of hinges and hinging type structures can be used to accomplish this purpose. These hinges include, but are not limited to, a variety of metal hinges that move on pins, a variety of plastic hinges that move on pins, and a variety of plastic hinges that move on flexible plastic. The entire panel assembly can be a continuous plastic piece manufactured with a plastic injection mold that includes flexible plastic hinges in the design. Rather than unfolding, the panel assemblies can fan out around pivoting types hinges. The fanning panel assemblies can use a variety of pins, screws, sex-bolts, or other centrally pivoting hinges. These centrally pivoting hinges can be located in a variety of positions on the surface of the panels to allow for a variety of folded configurations and unfolded configurations. The panels can also move between the open and closed positions, by moving on a variety of slides and rollers. The panel

assemblies can also fold down against each onto the bottom surface of the central frame structures. The panel assemblies can also pivot down into other possible configurations when not in use.

The function of the cinch cords is to mount the panel assemblies to the sides of the central frame structures. A variety of fixtures can be used to mount the panel assemblies. These include, but are not limited to, a variety of each of the following: clips, hose clamps, wires, cords, and hooks. The cinch cords can be eliminated if the panel assemblies were integrated into the central frame structures. The cinch cords can also be used in greater or lesser frequency in a variety of locations on the sides of the central frame structures.

The function of the trailer fork caps is to connect the panel assemblies to the bicycle trailer fork of the preferred embodiment when they are in their open position. A similarly constructed and positioned component on the other central frame structures will function in the same way. The term "panel mounting cap" refers to all of these embodiments. A variety of fixtures can be used for the panel mounting caps. These include, but are not limited to, a variety of each of the following: clamps, clips, ties, and screws. The panel mounting caps can be integrated into the central frame structure. The panel mounting caps can also be integrated into the top cover and be easily removable from the central frame structure.

The function of the top cover is to fill in the opening between the panel assemblies and to provide a central assembly that all of the components of the bicycle case can be drawn towards for creating structure throughout the bicycle case. The top cover can be constructed from a variety material. These include, but are not limited to, a variety of the following materials: pack cloth, canvas, other cloth, and plastic sheets. The top cover can be constructed in a variety of shapes. One example is a top cover that fits over the entire bicycle case. Other examples of possible changes will be adjustments to make the top cover convertible into a bag or ground cloth. The top cover can also be integrated into the panel assemblies of the central frame structure.

The function of the crossbar assemblies is to provide cross support members between the panel assemblies and mounting sections for the top cover. The crossbars can be constructed from a variety of structures. These include, but are not limited to, a variety of the following structures: tubes, rods, extrusions, and bars. The crossbars can be constructed from a variety of materials. These include, but are not limited to, a variety of the following materials: plastic, metal, wood, and composites. The crossbars assemblies can be attached to the top cover with a variety of fixtures. These include, but are not limited to, a variety of the following fixtures: straps, cords, and seams sewn into the top cover. The number and the placement of the crossbar assemblies along the panel assemblies can be increased or decreased.

The function of the crossbar caps is to provide a way to secure the crossbar assemblies, the panel assemblies and the edges of the top cover together. This can be an accomplished with a variety of fixtures. These include, but are not limited to, a variety of the following fixtures: hooks, levers, clips, clamps, pins, and screws. The crossbars can also be integrated into the panel assemblies.

The function of the handles of the top cover is to provide a place to hold while pulling the bicycle case and to provide a place to grab in order to pick up the bicycle case. The handles can be constructed from a variety of materials. These include, but are not limited to, a variety of the following: straps, handles, tubes, and cords. There can be more or less handles, and these handles can be placed in a variety of positions.

The function of the handlebar bag or the also used shipping/storage bag is to provide a means for securing the handlebar in place against the bicycle frame without damaging the bicycle frame. The handlebar bag or the shipping/storage bag when it is not in use for the first stated purpose also provides several alternative means for storing the components of the collapsible bicycle case. The handlebar bag and the handle bar bag can be constructed from a variety material. These include, but are not limited to, a variety of the following materials: pack cloth, canvas, other cloth, and plastic sheets. The handlebar bag and the shipping/ storage bag can be constructed in a variety of shapes. The handle bar bag and the shipping bag can be designed to hold the components of the collapsible bicycle cases in a variety of ways.

The function of the support straps is to provide support beneath the entire weight of the bicycle case when it is lifted by the center handles. The support straps also provide a further means for securing the top cover against the panel assemblies and also add to the overall strength of the structure of the bicycle case. The support straps can be made from a variety of materials. These include, but are not limited to, a variety of the following materials: straps, cords, cloth and wire. The support straps can interface with the top cover and the panel assemblies in a variety of ways, and there can be more or less of them.

The function of the front bracket is to provide a means for mounting the front dropouts of the bicycle to the central frame structure. The front bracket can be made with a variety of materials. These include, but are not limited to, a variety of the following materials: plastic, metal, composites, and wood. The front bracket can be made in a variety of structural shapes. These include, but are not limited to, a variety of the following structural shapes: u-brackets, channel assemblies, rod assemblies, tubing assemblies, and wire assemblies. The front bracket can be mounted in a variety of ways to the front end of the central frame structure. The mounts can also be integrated into the central frame structure in a variety of ways. Entirely different clamping

systems can be used for holding the front end of the bicycle in the bicycle case. For example, a tube clamp can hold the down tube of the bicycle or mount onto one or both of the fork legs.

The function of the rear bracket is to provide a means for mounting the rear dropouts of a bicycle to the central frame structure. The rear bracket can be made with a variety of materials. These include, but are not limited to, a variety of the following materials: plastic, metal, composites, and wood. The rear bracket can be made in a variety of structural shapes. These include, but are not be limited to, a variety of the following structural shapes: u-brackets, channel assemblies, rod assemblies, tubing assemblies, and wire assemblies. The rear bracket can be mounted to the central frame structure in a variety of ways. The rear bracket can be integrated into the central frame structure in a variety of ways. Other clamping systems can be used for mounting the rear end of the bicycle into the central frame structure. Other parts of the rear end of the bicycle frame can be clamped into position with a variety of fixtures

The function of the casters is to provide wheels for manually rolling the bicycle case. These casters swivel so that the bicycle case can be turned as it is pulled. A variety of casters, wheels, and caster mounting assemblies can be used on the bicycle case. Each of these can come in a variety of different shapes and sizes and can be mounted onto the central frame structure in a variety of ways.

The function of the derailleur guard is to provide extra protection for the rear derailleur of the bicycle. A variety of materials can be used for making the derailleur guard. These include, but are not limited to, a variety of the following: plastic, metals, composites, and wood. The derailleur guard can be made with a variety of protective structures. For example, a box or a wire frame can also be used. The derailleur guard can be mounted form a variety of places on the bicycle case including the rear bracket, the panel assemblies, and the central frame structure.

The function of the tensioner systems is to hold the disassembled bicycle at a protective distance from the shock absorbing panel assemblies and top cover. A variety of materials can be used for the tensioner cords. These include, but are not limited to, a variety of the following: cords, straps, and wires. The tensioners are attached to the central frame structure, the top tube of the bicycle, and the front and rear brackets. This can be accomplished with a variety of clips, clamps, straps, hooks, or other fixtures. The number and placement of the tensioners can also be changed. The tensioners can also be eliminated altogether without altering the basic function of the bicycle case.

The arrangement of the disassembled bicycle parts can be altered to accommodate changes in the overall design of the bicycle case. The wheels can be mounted in different positions against the bicycle frame. The seat post could be mounted in a large variety of areas in the bicycle case, especially with the implementation of a specific mounting device.

The collapsible bicycle case frame functions as the central frame structure for the bicycle case in the additional embodiment. The collapsible bicycle case frame can integrate all of the components of the bicycle case into itself. The collapsible frame can fold up in a variety of ways with the swing arm joints and the panel support joints pivoting in a variety of directions. The component parts of the collapsible frame can be made in a variety of structural shapes and with a variety of materials and fixtures.

Accordingly, the scope of the invention shall not be determined by the embodiments illustrated but by the appended claims and their legal equivalents.